

## REMARKS

Applicant respectfully requests further examination and reconsideration in view of the above amendments. Claims 1-10 remain pending in the case. Claims 1-10 are rejected. Claims 1 and 7 are amended herein. No new matter has been added.

### 35 U.S.C. §102(b)

Claims 1, 2, 4, 6 and 7 stand rejected under 35 U.S.C. §102(b) as being anticipated by United States Patent Application Publication 2003/0068150 by Ariel et al., hereinafter referred to as the "Ariel" reference. Applicant has reviewed the cited reference and respectfully submits that the embodiments of the present invention as recited in Claims 1, 2, 4, 6 and 7 are not anticipated by Ariel in view of the following rationale.

### Claims 1, 2, 4 and 6

Applicant respectfully directs the Examiner to independent Claim 1 that recites that an embodiment of the present invention is directed to (emphasis added):

An optical wave-guide absorption cell, comprising:  
a first wave-guide;  
a holey wave-guide filled with a known selective absorption medium, wherein a first terminus of said holey wave-guide is coupled to a first terminus of said first wave-guide; and  
a second wave-guide, wherein a first terminus of said second wave-guide is coupled to a second terminus of said holey wave-guide.

Claims 2, 4 and 6 that depend from independent Claim 1 provide further recitations of the features of the present invention.

According to the Federal Circuit, "[a]nticipation requires the disclosure in a single prior art reference of each claim under consideration" (W.L. Gore & Assocs. v. Garlock

Inc., 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983)). However, it is not sufficient that the reference that the reference recite all the claimed elements. As stated by the Federal Circuit, the prior art reference must disclose each element of the claimed invention “arranged as in the claims” (emphasis added; Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)).

In the current Office Action, the Examiner makes reference to different embodiments of Ariel in supporting the grounds of rejection. Applicant respectfully submits that the Examiner relies on a first embodiment of Ariel, described in Figures 5-6C, for teaching “a first wave guide” and a “second wave guide,” and relies on a second embodiment of Ariel, describe in Figures 9-10C for teaching “a known selective absorption medium.” The first embodiment pertains to capping a photonic-crystal fiber with an optical plate ([0058]; [0066] through [0070]). In contrast, the second embodiment pertains to sealing a photonic-crystal fiber by introducing a sealing material into the air channels ([0076] through [0084]). In particular, Applicant respectfully asserts that the two embodiments relied on by the Examiner are mutually exclusive. In other words, Ariel teaches that the photonic-crystal fiber is either capped with an optical plate or sealed by introducing sealing material into the air channels, but does not teach both capping and sealing.

Applicant respectfully asserts that combining different embodiments of Ariel is improper for an anticipation rejection, as Ariel does not disclose each element of the claimed invention “arranged as in the claims.” In other words, Applicant respectfully asserts that the Examiner has improperly combined different embodiments of Ariel, and that anticipation of such a combination is not supported by Ariel.

As described above, the prior art reference must disclose each element of the claimed invention "arranged as in the claims" to support an anticipation rejection. The Examiner relies on different embodiments of Ariel as teaching different claim limitations. In particular, the different embodiments are mutually exclusive. Applicant respectfully asserts that relying on the teachings of the different embodiments of Ariel is improper, as the combination does not disclose each element "as arranged in the claims." Therefore, Applicant respectfully asserts that the rejection of Claims 1, 2, 4 and 6 under 35 U.S.C. § 102(a) is not proper, and that Claims 1, 2, 4 and 6 thus overcome the rejection under 35 U.S.C. § 102(a).

Claim 1, 2, 4, 6 and 7

Ariel and the claimed invention are very different. Applicant understands Ariel to teach a method of preventing contamination of the air channel in the capillaries or pores of an air-clad or photonic-crystal fiber during polishing of the end faces. Ariel teaches that the capillaries are sealed so as to prevent contamination to the air channels of the fiber (Abstract). In particular, Applicant respectfully asserts that Ariel does not teach, describe or suggest that the air capillaries of the fiber are "filled with a known selective absorption medium," as recited in Claim 1. Claim 7 recites a similar limitation.

Figures 6A, 6B and 6C of Ariel illustrate steps in a method of fabricating a protected end-face of an air-clad or photonic-crystal fiber. Figure 6C shows plate 112 permanently attached to fiber 50, "thereby sealing the channels and pores of air cladding 56, and preventing humidity and other contaminants from entering" ([0071]). In particular, Ariel does not teach, describe or suggest that the channels of fiber 50 contain "a known selective absorption medium," as claimed.

Applicant has reviewed the cited reference, paragraph [0075] of Ariel, and is unable to locate a reference that teaches “the photonic crystal fiber comprises holes or voids that are filled with polymeric fluid,” as recited in the present Detailed Action. Applicant understands the Examiner to rely on the teaching of Ariel that a polymeric fluid is introduced into the air capillaries. However, as shown in Figures 10A through 10C of Ariel, fluid 162 is drawn into an air channel to a certain fluid height 170. Specifically, fluid 162 does not fill the air channel, but rather is drawn into an air channel to certain fluid height 170, where it is then cured into solid polymer 172. Solid polymer 172 is located in one end of the air channel, leaving the majority of the air channel open.

Therefore, Applicant respectfully asserts that nowhere does Ariel teach, disclose or suggest the claimed embodiments of the present invention as recited in independent Claims 1 and 7, that these claims overcome the rejection under 35 U.S.C. § 102(a), and are thus in a condition for allowance. Applicant respectfully submits the Ariel also does not teach or suggest the additional claimed features of the present invention as recited in Claims 2, 4 and 6 that depend from independent Claim 1. Therefore, Applicant respectfully submits that Claims 2, 4, and 6 also overcome the rejection under 35 U.S.C. § 102(a), and are in a condition for allowance as being dependent on an allowable base claim.

#### Claim 7

Applicant respectfully directs the Examiner to independent Claim 7 that recites that an embodiment of the present invention is directed to (emphasis added):

A fiber optic absorption cell comprising a holey fiber optic cable adapted for propagating an optical signal, wherein said holey fiber optic cable comprises:  
a core;  
a plurality of voids formed in said core;  
a known selective absorption medium filling said plurality of voids;  
and  
a fill hole formed in said core, wherein said fill hole is an opening into said core that is not at a terminus of said holey fiber optic cable, said fill hole adapted to introduce said known selective absorption medium into said plurality of voids.

Ariel and the claimed invention are very different. Applicant understands Ariel to teach a method of preventing contamination of the air channel in the capillaries or pores of an air-clad or photonic-crystal fiber during polishing of the end faces. Ariel teaches that the capillaries are sealed so as to prevent contamination to the air channels of the fiber (Abstract). In particular, Applicant respectfully asserts that Ariel does not teach, describe or suggest that the photonic-crystal fiber includes "a fill hole formed in said core, wherein said fill hole is an opening into said core that is not at a terminus of said holey fiber optic cable," as claimed (emphasis added).

Applicant respectfully asserts that Ariel does not teach, describe or suggest such a limitation. In particular, Ariel does not teach, describe or suggest any opening into the fiber at all, as Ariel specifically teaches forming a protective layer at the end-face of the fiber to prevent humidity and contamination ([0071] and [0084]). Therefore, Applicant respectfully submits that Claim 7 overcomes the rejection under 35 U.S.C. § 102(a), and is in a condition for allowance as Ariel does not teach, describe or suggest a "a fill hole formed in said core, wherein said fill hole is an opening into said core that is not at a terminus of said holey fiber optic cable," as claimed.

35 U.S.C. §103(a)

Claim 3

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Ariel in view of United States Patent Application Publication 2003/0081906 by Filhaber et al., hereinafter referred to as the "Filhaber" reference. Claim 3 depends from independent Claim 1. Applicant has reviewed the cited references and respectfully submits that the embodiments of the present invention as recited in Claim 3 is not rendered unpatentable over Ariel in view of Filhaber for the following rationale.

As described above, Ariel and the claimed invention are very different. Applicant understands Ariel to teach a method of preventing contamination of the air channel in the capillaries or pores of an air-clad or photonic-crystal fiber during polishing of the end faces. In particular, Applicant respectfully asserts that Ariel does not teach, describe or suggest that the air capillaries of the fiber are "filled with a known selective absorption medium," as claimed. Moreover, by teaching a method for preventing contamination of the air channel wherein a solid polymer is formed in one end of the air channel, Ariel teaches away from an optical wave-guide absorption cell including "a holey wave-guide filled with a known selective absorption medium" (emphasis added), as claimed.

Moreover, the combination of Ariel and Filhaber fails to teach or suggest this claim limitation because Filhaber does not overcome the shortcomings of Ariel. Applicant understands Filhaber to teach a system and method of bonding optical components. In particular, Applicant respectfully asserts that Filhaber does not teach, describe, or suggest an optical wave-guide absorption cell including "a holey wave-guide filled with a known selective absorption medium," as claimed. Therefore, Applicant respectfully asserts that Filhaber does not teach, disclose, or the claimed embodiments.

Furthermore, Applicant respectfully asserts that there is no motivation to combine the teachings of Ariel and Filhaber. Applicant understands Ariel to teach the use of a fusion splice in attaching a photonic-crystal fiber to a rod ([0067]). In particular, fusion splicing is selected to protect photonic-crystal fiber air channels and pores from the penetration of humidity and other contamination.

In contrast, Claim 3 recites “wherein said first terminus of said holey wave-guide is coupled to said first terminus of said first wave-guide utilizing a light transmitting adhesive” (emphasis added). Applicant respectfully submits that by teaching a need for protecting the air channels from humidity and other contamination, Ariel teaches away from the use of a light transmitting adhesive as claimed.

Applicant respectfully asserts that nowhere does the combination of Ariel and Filhaber teach, disclose or suggest the present invention as recited in independent Claim 1, that this claim overcomes the rejection under 35 U.S.C. § 103(a), and is thus in condition for allowance. Applicant respectfully submits the combination of Ariel and Filhaber also does not teach or suggest the additional claimed features of the embodiment of the present invention as recited in Claim 3 that depends on independent Claim 1. Therefore, Applicant respectfully submits that Claim 3 overcomes the rejection under 35 U.S.C. § 103(a), and that this claim is thus in a condition for allowance.

#### Claims 5 and 8

Claims 5 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ariel in view of United States Patent 6,496,634 by Levenson, hereinafter referred to as the “Levenson” reference. Claim 5 depends from independent Claim 1 and Claim 8 depends from independent Claim 7. Applicant has reviewed the cited reference and

respectfully submits that the embodiments of the present invention as recited in Claims 5 and 8 are not rendered unpatentable over Ariel in view of Levenson for the following rationale.

As described above, Ariel and the claimed invention are very different. As acknowledged by the Examiner in the present Detailed Action, Ariel does not teach “a fill hole formed in said core, wherein said fill hole is an opening into said core that is not at said first terminus of said holey wave-guide and is not at said second terminus of said holey wave-guide, said fill hole adapted to introduce said known selective absorption medium into said plurality of voids,” as claimed.

Applicant respectfully asserts that Ariel does not teach, describe or suggest such a limitation. In particular, Ariel does not teach, describe or suggest any opening into the fiber at all, as Ariel specifically teaches forming a protective layer at the end-face of the fiber to prevent humidity and contamination ([0071] and [0084]). Applicant understands the intended purpose of Ariel to be protecting the air channels and pores from humidity and other contamination. Applicant respectfully asserts that by teaching the use of a fusion splice for protecting the interior of the air channels from any outside contamination, Ariel teaches away from the claimed embodiment.

Moreover, the combination of Ariel and Levenson fails to teach or suggest the present invention as claimed because the combination of Ariel and Levenson does not satisfy the requirements of a *prima facie* case of obviousness. In order to establish a *prima facie* case of obviousness, the prior art must suggest the desirability of the claimed invention (MPEP 2142). In particular, “if the proposed modification or combination of the prior art would change the principle of operation of the prior art



invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious” (emphasis added) (MPEP 2143.01; *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). Moreover, “[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed amendment” (emphasis added) (MPEP 2143.01; *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

As described above, Applicant understands Ariel to teach a photonic-crystal fiber that is sealed for protecting the air channels and pores from humidity and other contamination. In particular, the principle of operation of Ariel is to protect the air channels and pores from contamination. Applicant respectfully asserts that modifying Ariel to include a fill hole, as taught in Levenson, would render Ariel inoperable for its intended purpose. Therefore, Applicant respectfully asserts that there is no suggestion to modify the teachings of Ariel and Levenson as suggested by the Examiner, as the teaching of Ariel teach away from the modification as suggested by the Examiner.

Applicant respectfully asserts that there is no suggestion or motivation to combine the teachings of Ariel and Levenson as suggested by the Examiner. Therefore, Applicant respectfully submits that Claims 1 and 7 overcome the rejection under 35 U.S.C. § 103(a), and are thus in condition for allowance. Therefore, Applicant respectfully submits that Claim 5 and 8 overcome the rejection under 35 U.S.C. § 103(a), and that this claim is thus in a condition for allowance, as these claims are dependent on allowable base claims.

#### Claims 9 and 10

Claims 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ariel in view of “Evanescent-wave gas sensing using microstructure fiber” by Hoo et al., hereinafter referred to as the “Hoo” reference. Claims 9 and 10 depend from independent Claim 7. Applicant has reviewed the cited references and respectfully submits that the embodiments of the present invention as recited in Claims 9 and 10 are not rendered unpatentable over Ariel in view of Hoo for the following rationale.

As described above, Ariel and the claimed invention are very different. Applicant understands Ariel to teach a method of preventing contamination of the air channel in the capillaries or pores of an air-clad or photonic-crystal fiber during polishing of the end faces. In particular, Applicant respectfully asserts that Ariel does not teach, describe or suggest that the air capillaries of the fiber are “filled with a known selective absorption medium,” as claimed. Moreover, by teaching a method for preventing contamination of the air channel, Ariel teaches away from an optical wave-guide absorption cell including “a holey wave-guide filled with a known selective absorption medium” (emphasis added), as claimed.

Moreover, the combination of Ariel and Hoo fails to teach or suggest this claim limitation because Hoo does not overcome the shortcomings of Ariel. Applicant understands Hoo to teach evanescent-wave gas sensing using microstructure fiber. Hoo teaches that a microstructure fiber is loaded with acetylene gas using a gas chamber by placing one end of the fiber within the gas chamber (see paragraph spanning pages 8 and 9). Applicant respectfully asserts that Hoo does not teach coupling the fiber at either end to a wave-guide, as claimed. In contrast, Hoo teaches that the fiber is coupled to a 3-D translation stage and an optical power meter. Moreover, by teaching that the fiber is loaded with acetylene at the end, Hoo teaches

away from the limitation of “a fill hole formed in said core, wherein said fill hole is an opening into said core that is not at a terminus of said holey fiber optic cable, said fill hole adapted to introduce said known selective absorption medium into said plurality of voids,” (emphasis added) as claimed. Therefore, Applicant respectfully asserts that Hoo does not teach, disclose, or the claimed embodiments.

Furthermore, Applicant respectfully asserts that there is no suggestion to combine the teachings of Ariel and Hoo as suggested by the Examiner, as Ariel teaches away from the combination with Hoo. As described above, Ariel teaches a method of preventing contamination of the air channel in the capillaries or pores of an air-clad or photonic-crystal fiber during polishing of the end faces by sealing off the end faces of the fiber. In contrast, Hoo teaches loading a fiber at one end with gas. Since the end of the fiber of Ariel is sealed, it would not be possible to load the fiber of Ariel with gas at the end of the fiber without rendering the fiber of Ariel inoperable for its intended purpose of preventing contamination.

Applicant respectfully asserts that nowhere does the combination of Ariel and Hoo teach, disclose or suggest the present invention as recited in independent Claim 7, that this claim overcomes the rejection under 35 U.S.C. § 103(a), and is thus in condition for allowance. Applicant respectfully submits the combination of Ariel and Hoo also does not teach or suggest the additional claimed features of the embodiment of the present invention as recited in Claims 9 and 10 that depend on independent Claim 7. Therefore, Applicant respectfully submits that Claims 9 and 10 overcome the rejection under 35 U.S.C. § 103(a), and that these claims are thus in a condition for allowance.

### CONCLUSION

In light of the above remarks, Applicant respectfully requests reconsideration of the rejected claims. Based on the arguments presented above, Applicant respectfully asserts that Claims 1-10 overcome the rejections of record and, therefore, Applicant respectfully solicits allowance of these Claims. The Examiner is invited to contact Applicant's undersigned representative if the Examiner believes such action would expedite resolution of the present Application.

Respectfully submitted,

WAGNER, MURABITO & HAO L.L.P.

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John P. Wagner, Jr.  
Registration No. 35,398

Two North Market Street  
Third Floor  
San Jose, CA 95113  
(408) 938-9060